

sustainable water resource management

Winter
Haven, FL
& the Peace Creek
Watershed



PBSJ® **WINTER HAVEN**
The Chain of Lakes City



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Sustainable Water Resource Management:

“the use of water resources in a way that meets the needs of the present...

...without compromising the ability of future generations to meet their own needs”

*Based upon the June 1987 Brundtland Commission Report
(UN World Commission on Environment and Development)*

Purpose and Overview: Goals of the Plan

Meet long-term water resource needs of people and natural systems.

Manage water as a finite, interconnected resource.

Take a leadership role in managing water.

Use Existing experience, information and science to make good long-term decisions.

Preserve and restore the natural infrastructure to provide multiple benefits.

Goals of the Plan, continued

Ensure that all approaches for water are aligned with goals for economic growth.

Mitigate impacts to water within the watershed.

Integrate water storage into the community using nature parks.

Manage land to *improve* water in the future, not just keep it the same or allow them to degrade.

Chapter 1: Introduction

Water: the most essential resource on the planet...connects and sustains human and natural environments

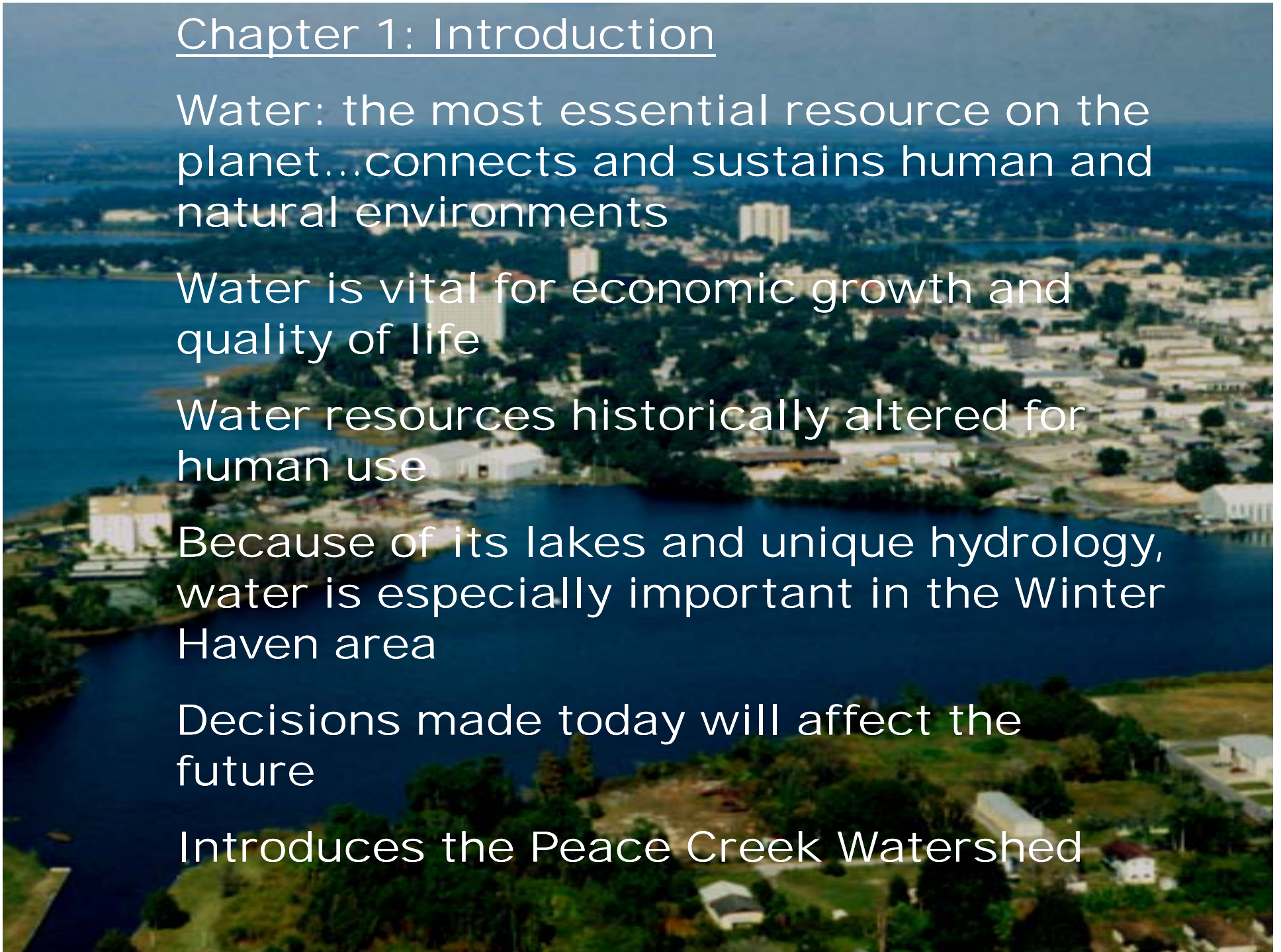
Water is vital for economic growth and quality of life

Water resources historically altered for human use

Because of its lakes and unique hydrology, water is especially important in the Winter Haven area

Decisions made today will affect the future

Introduces the Peace Creek Watershed

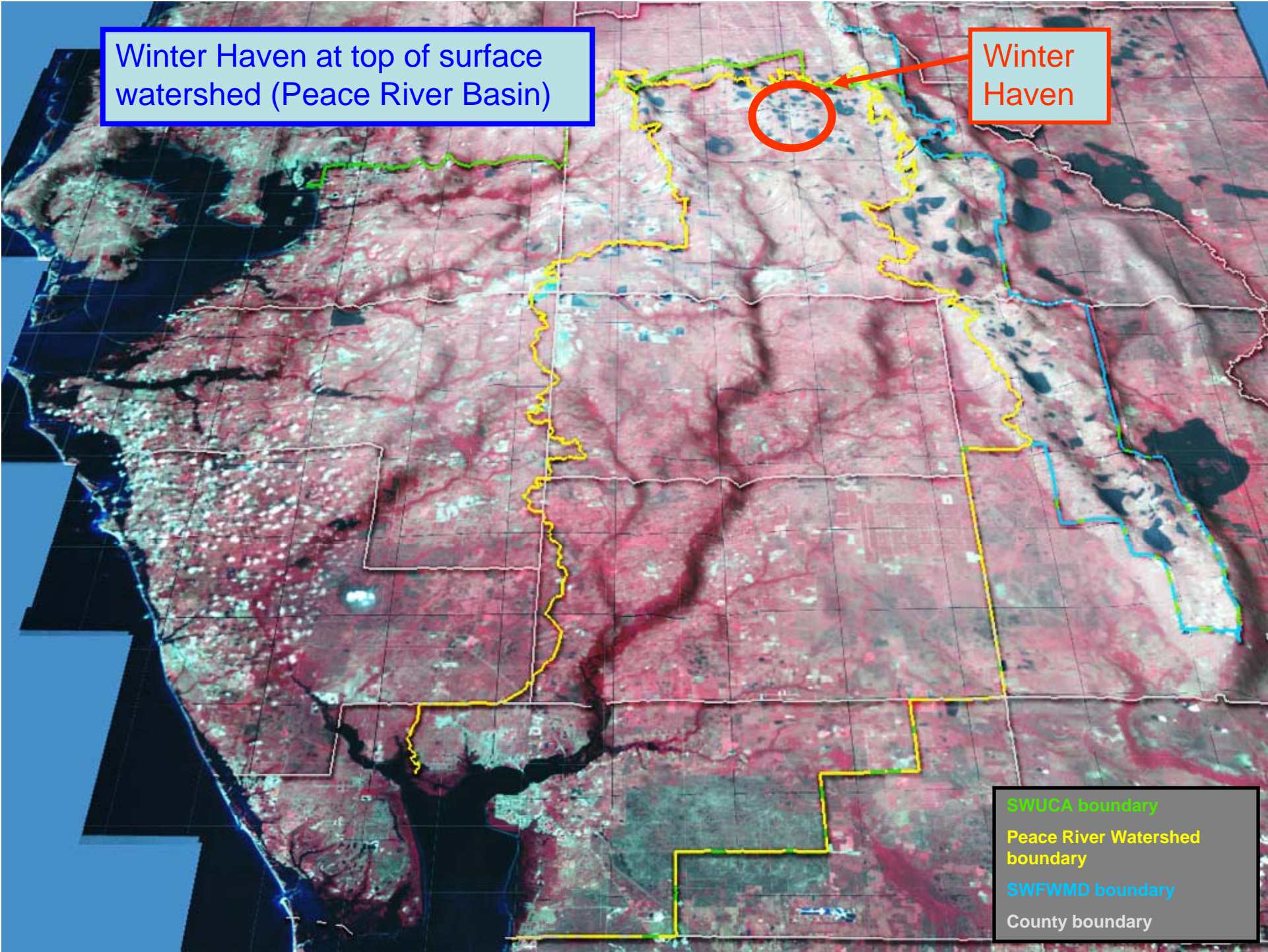


Winter Haven at top of surface watershed (Peace River Basin)

Winter Haven












SWUCA boundary
Peace River Watershed boundary
SWFWMD boundary
County boundary





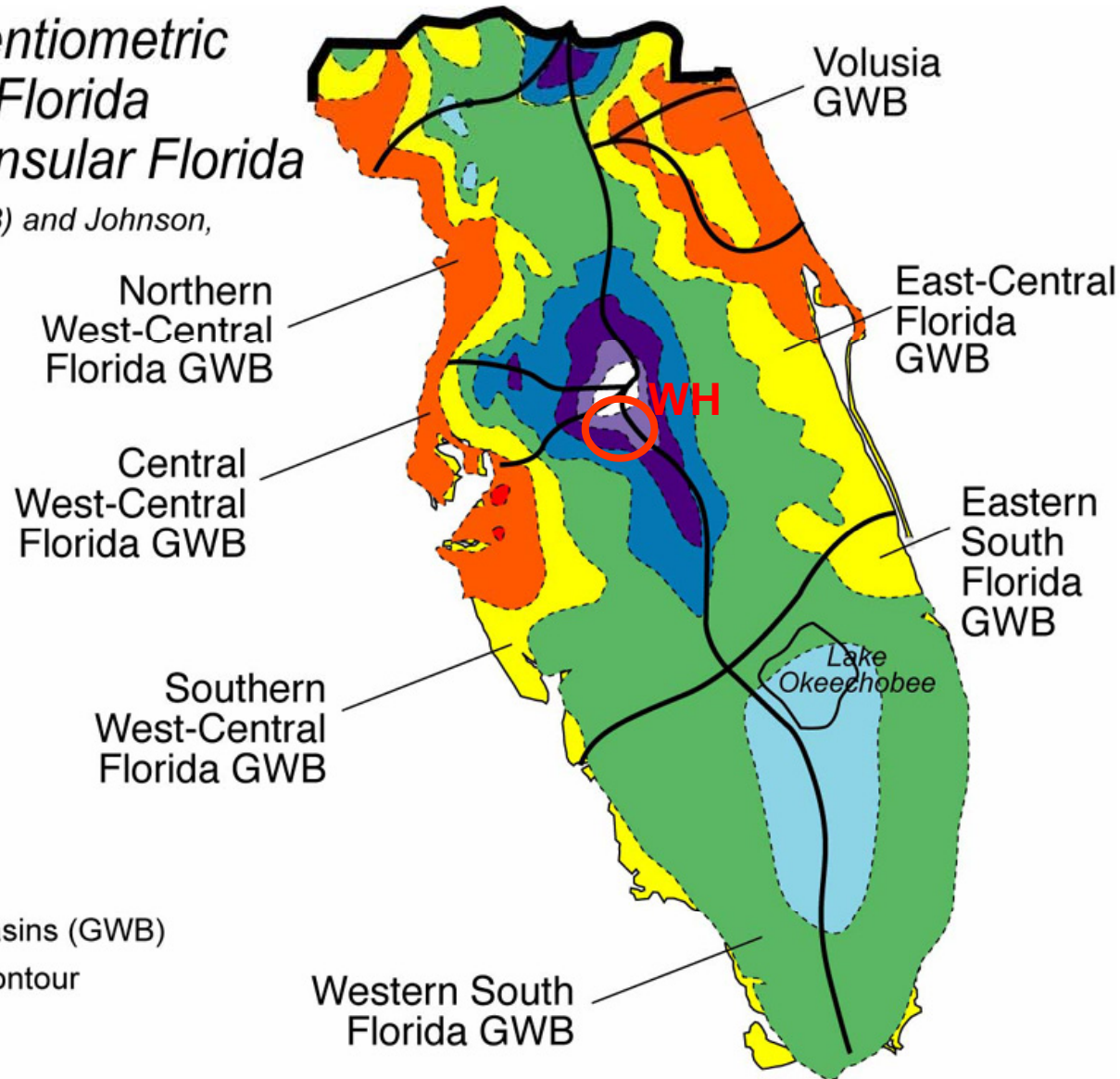
Winter Haven also at top of Groundwater Basin

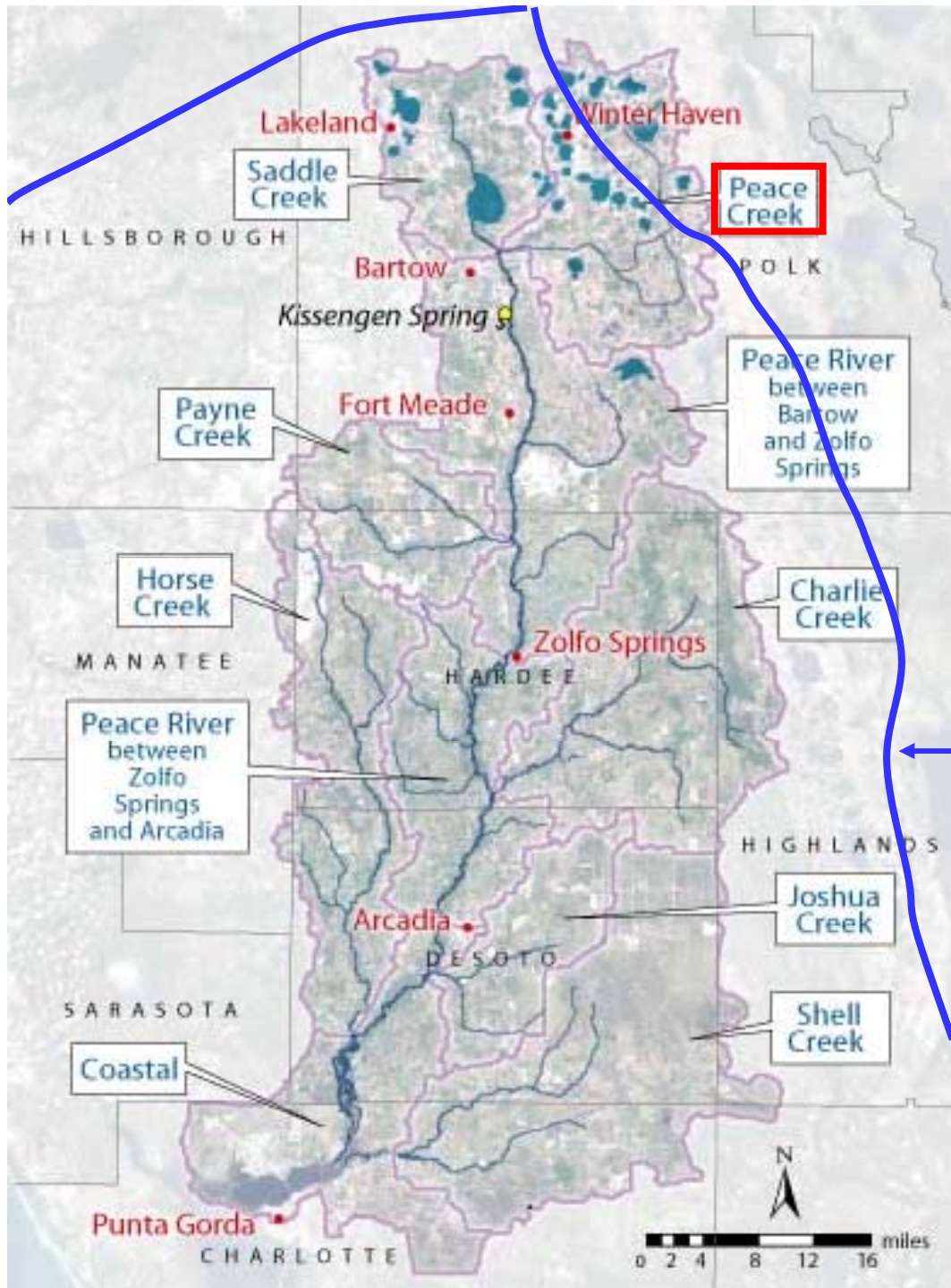
May 1980 Potentiometric Surface of the Florida Aquifer in Peninsular Florida

Modified from Fisk (1983) and Johnson, Healy and Hayes (1981)

-  > 120'
-  100' to 120'
-  80' to 100'
-  60' to 80'
-  50' to 60'
-  40' to 60'
-  20' to 40'
-  0' to 20'
-  < 0'

-  Ground-Water Basins (GWB)
-  Potentiometric Contour



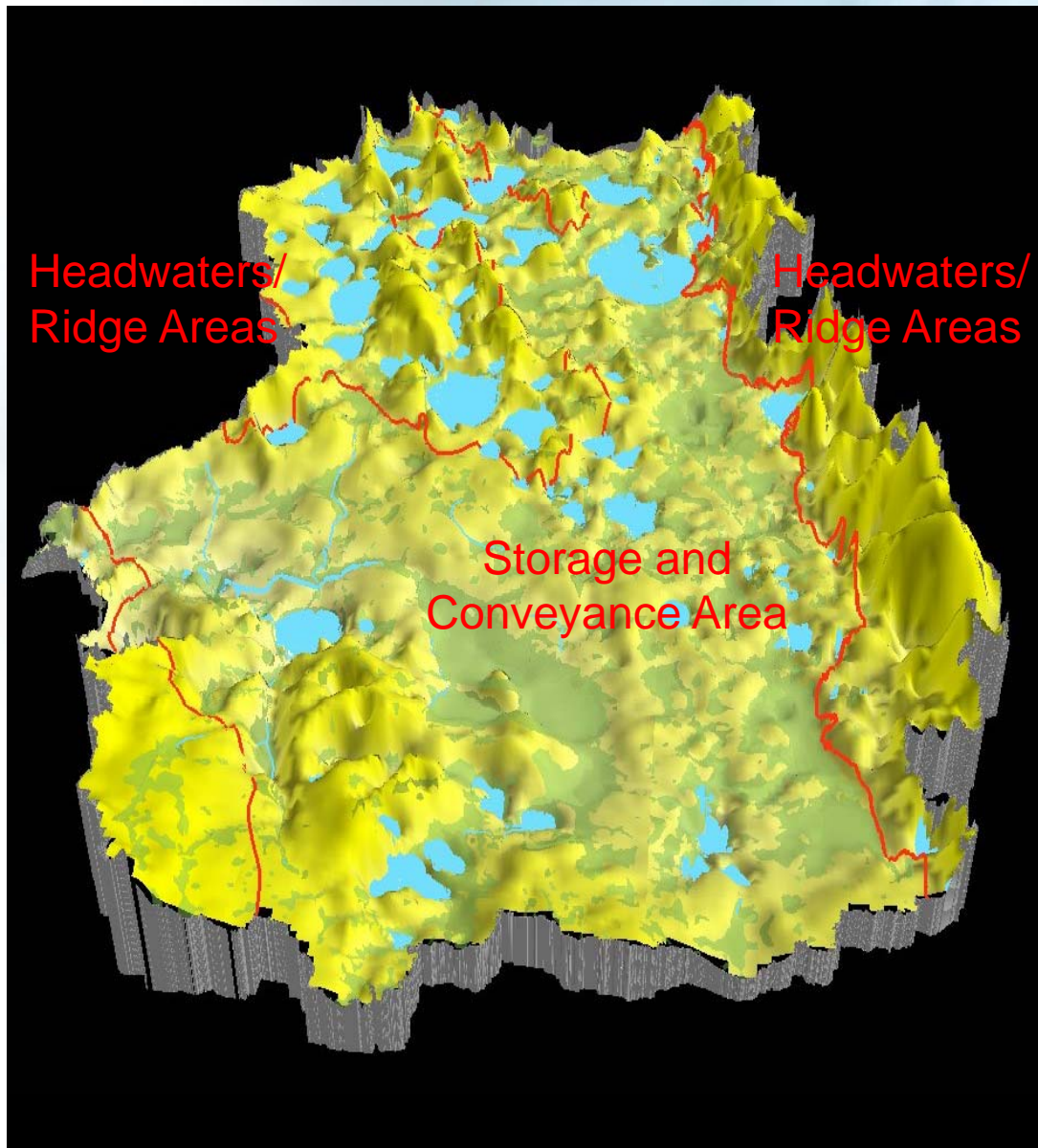


Result: Only source of water comes from rainfall within the immediate watershed.

Note: Location of Peace Creek Watershed as a sub-basin of Peace River Watershed

← Groundwater Divide

Relief map of historical Peace Creek Watershed



Natural Hydrology of the Peace Creek Watershed:

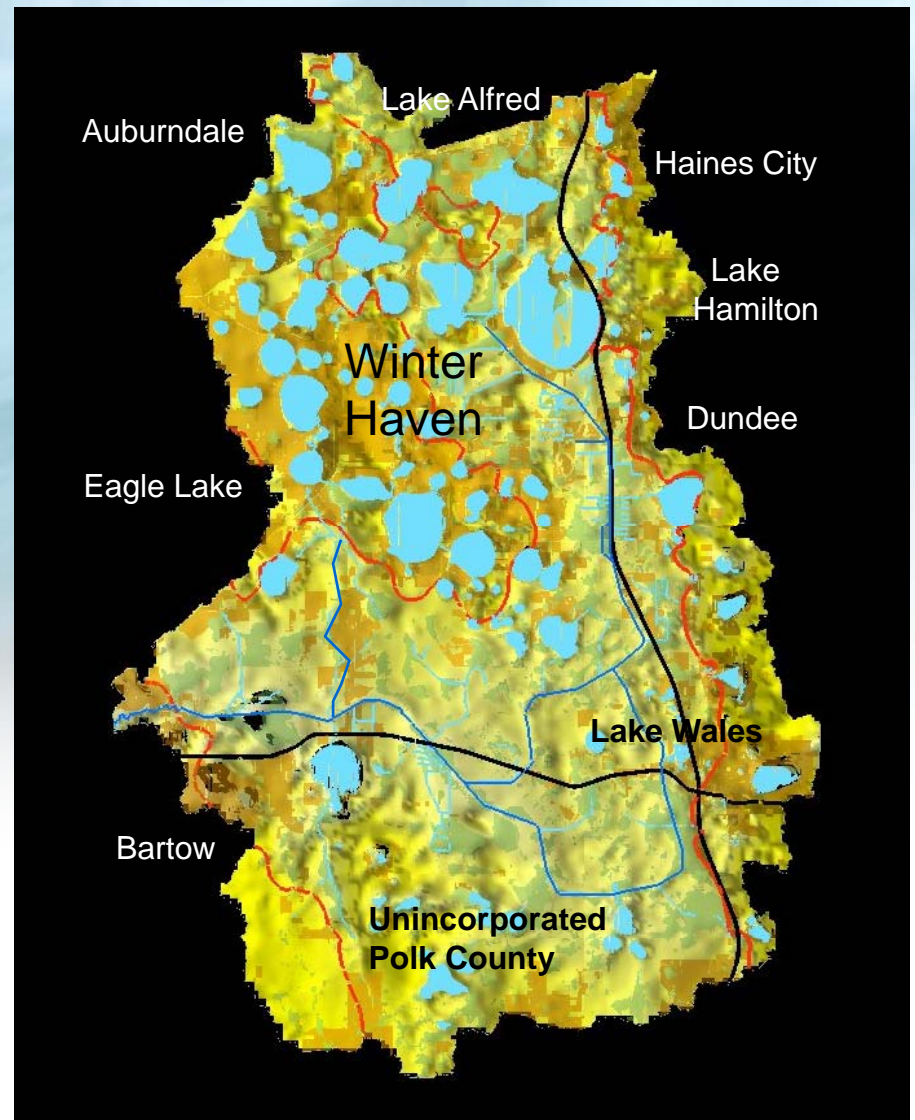
No runoff from ridge areas – all water percolated into the ground.

Lower areas stored vast quantities of water and moved water slowly out of the system.

Natural patterns of storage/evaporation

Today's Peace Creek Watershed – 100 years of change:

Drainage Ditches
Impervious Surfaces
Aquifer Decline
Canals Between Lakes

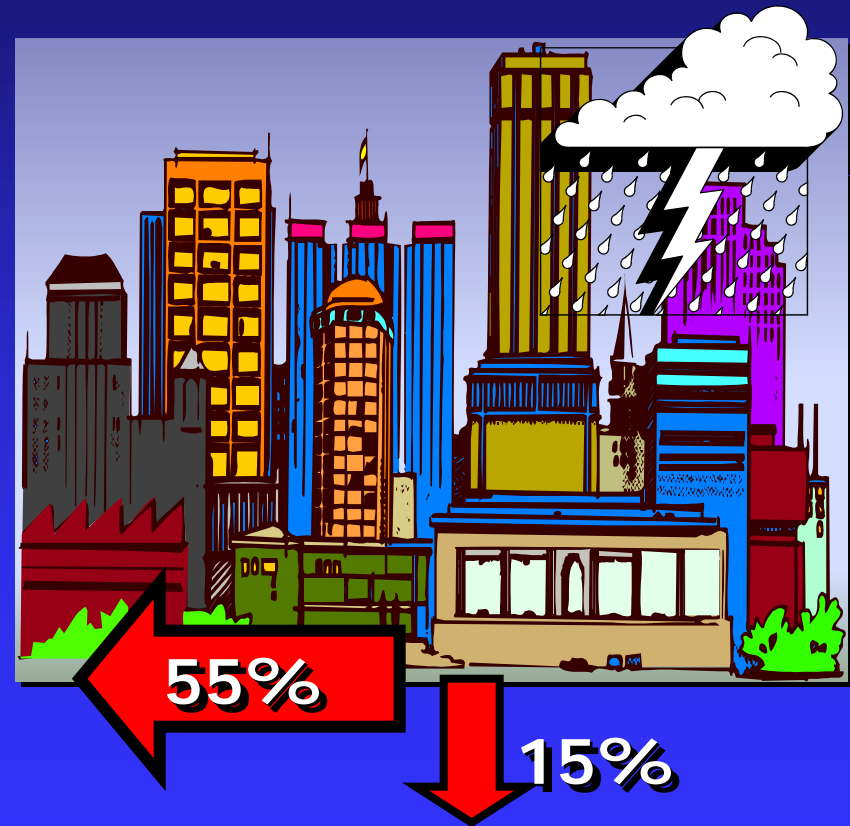
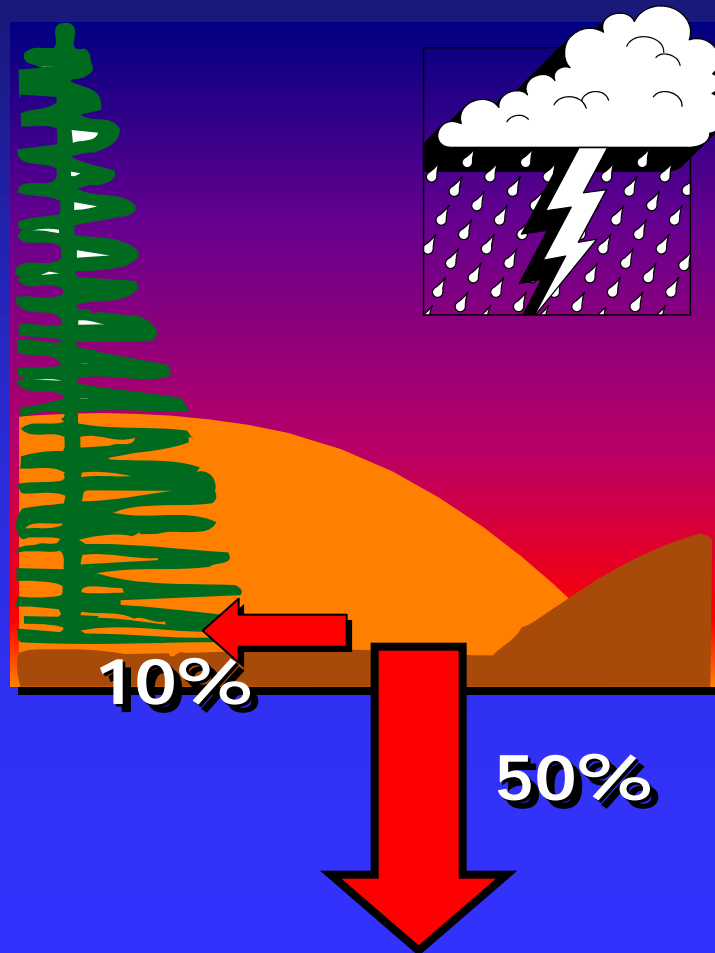




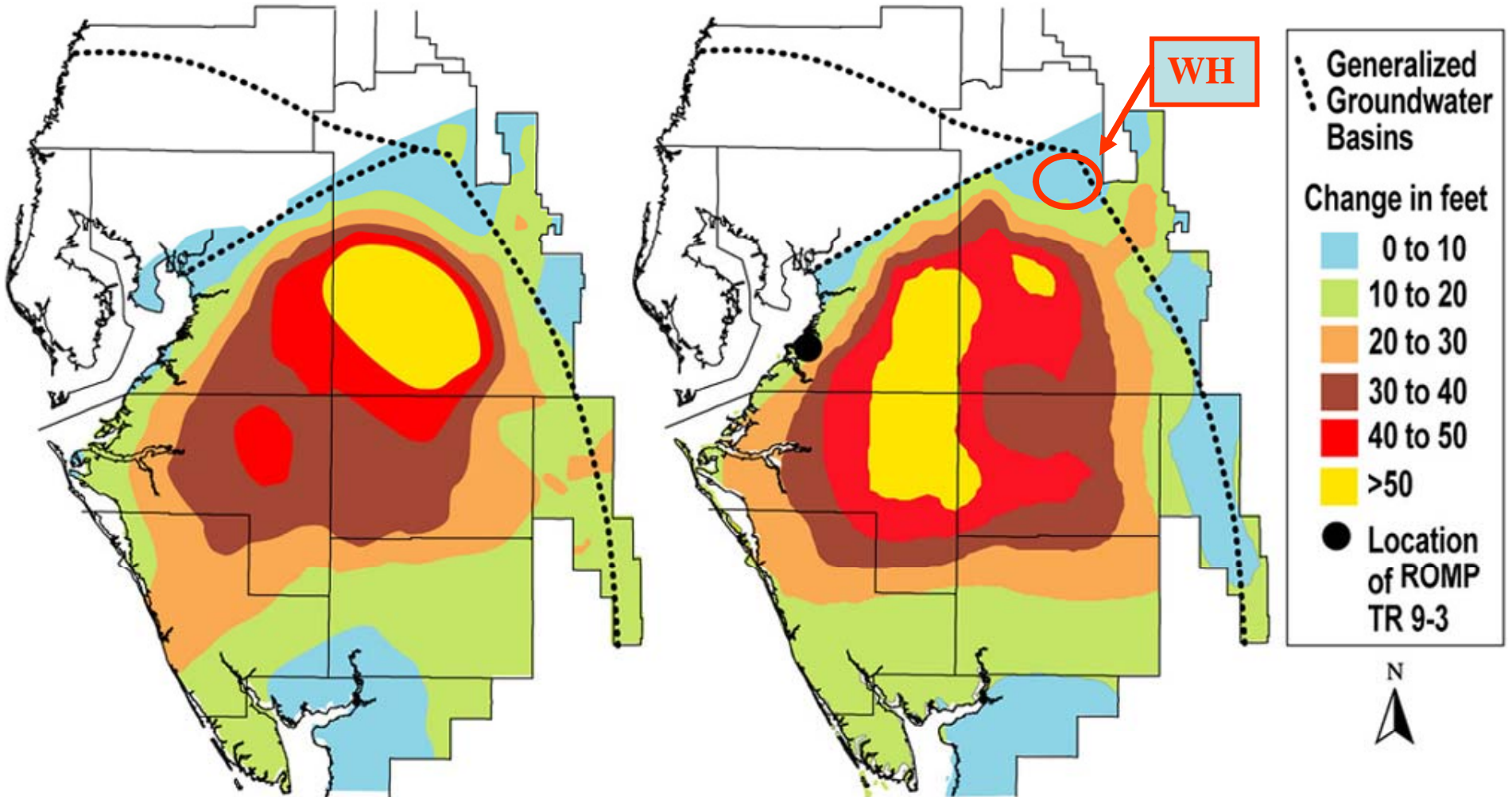
Peace Creek Drainage Canal



Development Impacts on the Water Cycle



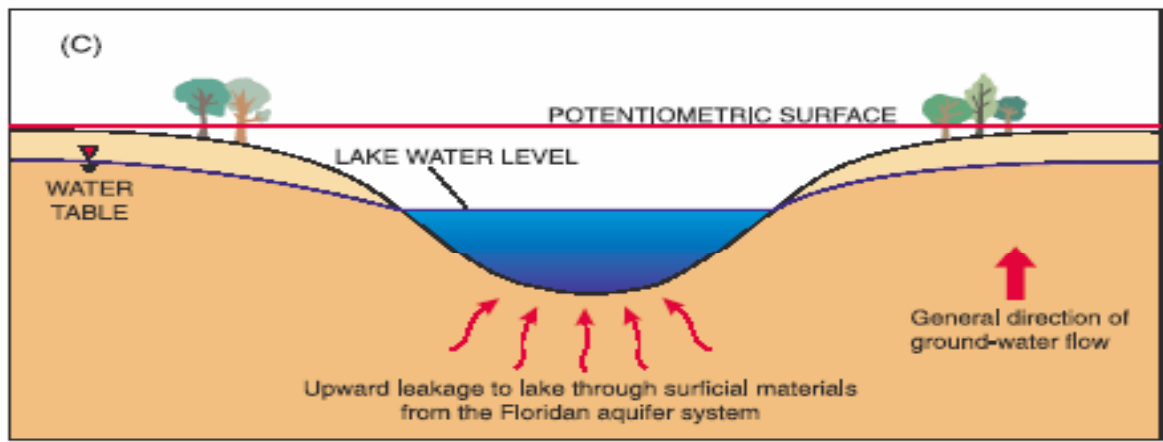
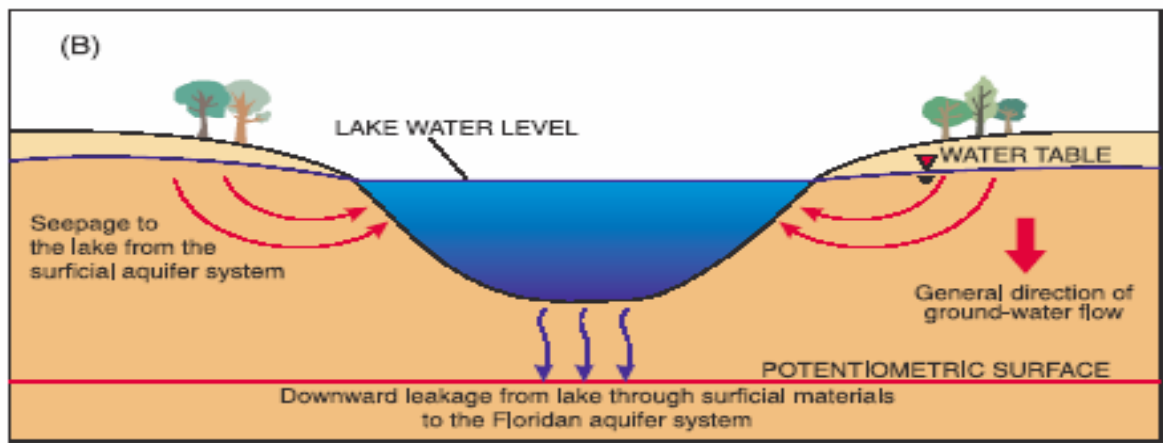
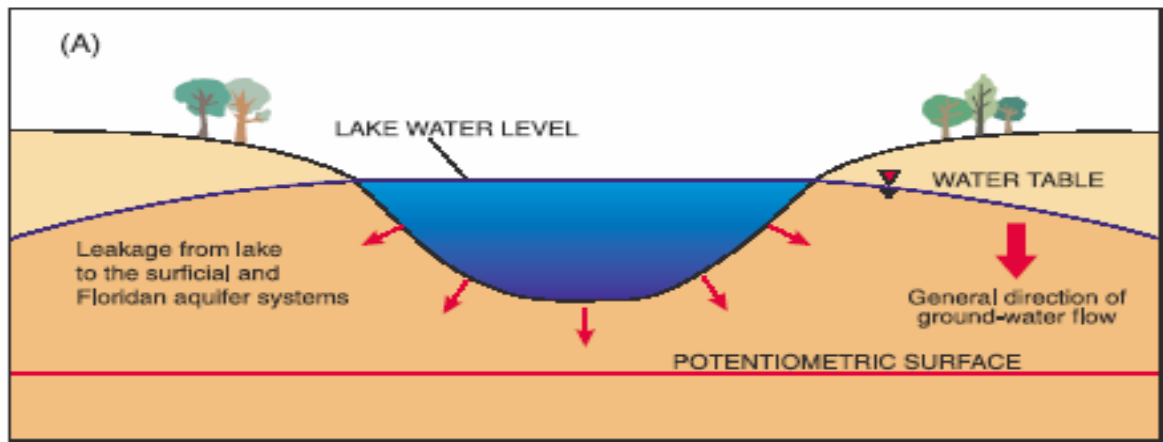
Regional Aquifer Declines



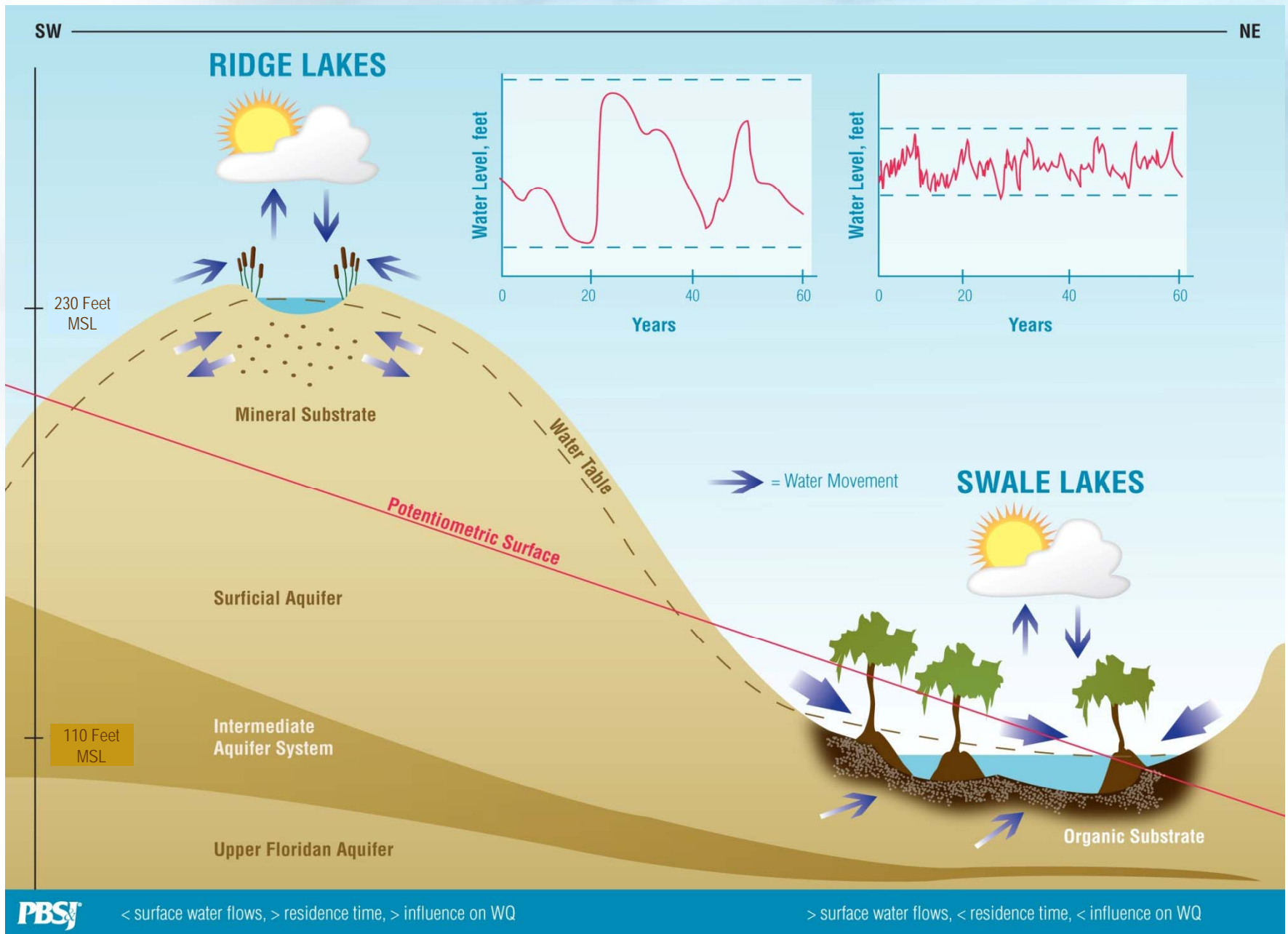
Predevelopment to 1975

Predevelopment to 2000

Affects of Aquifer Declines on Lake Hydrology



Ridge and Valley (Swale) Lakes



Chapter 2 - Concepts/Conclusions:

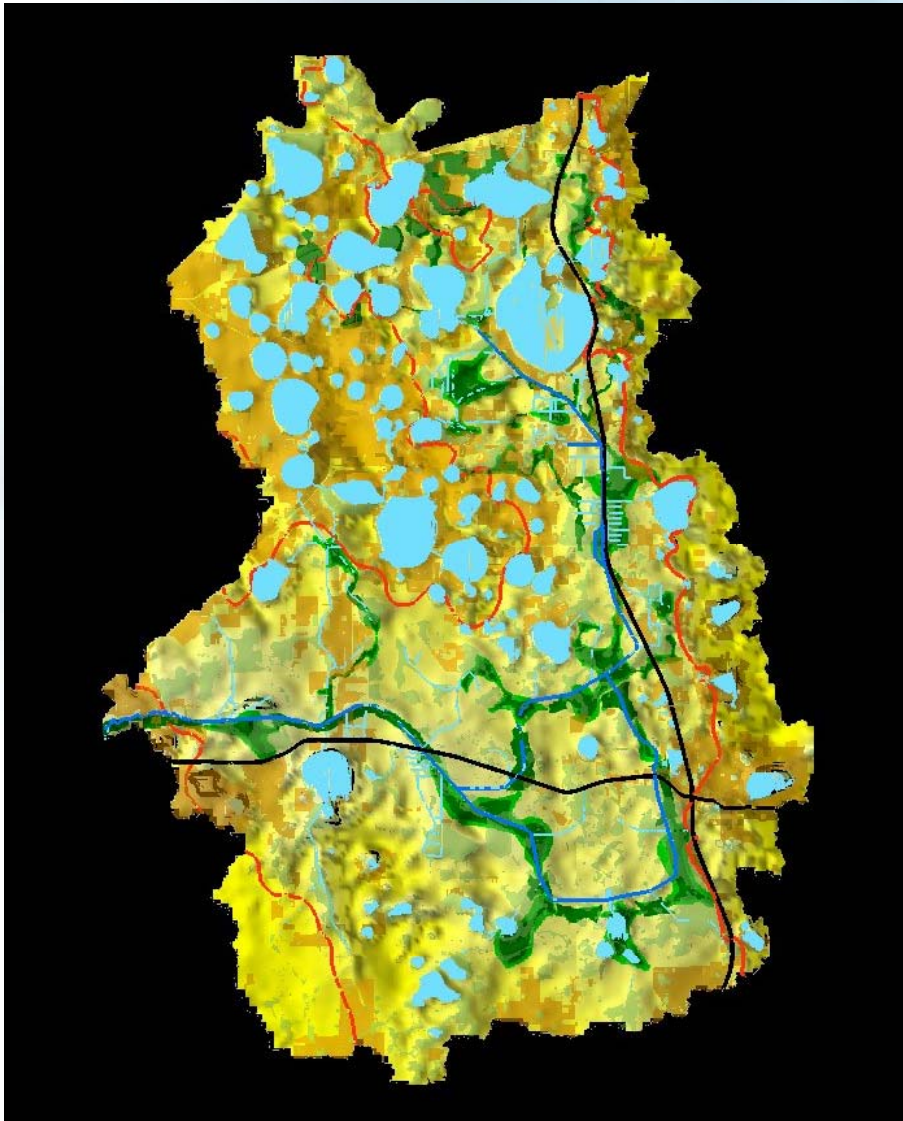
Population/economic growth will continue – if we continue as in the past, further degradation to water resources will occur

Decisions made today will affect local and regional water resources

Re-creating lost storage will provide multiple benefits for water supply, water quality, flooding and natural systems such as lakes

What is good for lakes/environment is good for the community (water supply/economic growth)

Because of our location/geology, what falls as rain is our water budget



Chapter 3 – Restoring the Hydrologic Network of the Peace Creek Watershed

Two Primary Concepts:

Ridge/Sand Hill Areas:
Increased Infiltration

Valley/Low Areas:
Increased Storage/
Conveyance



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Headwaters/Ridge Areas - Increase Treatment & Infiltration

Capture runoff from roofs:

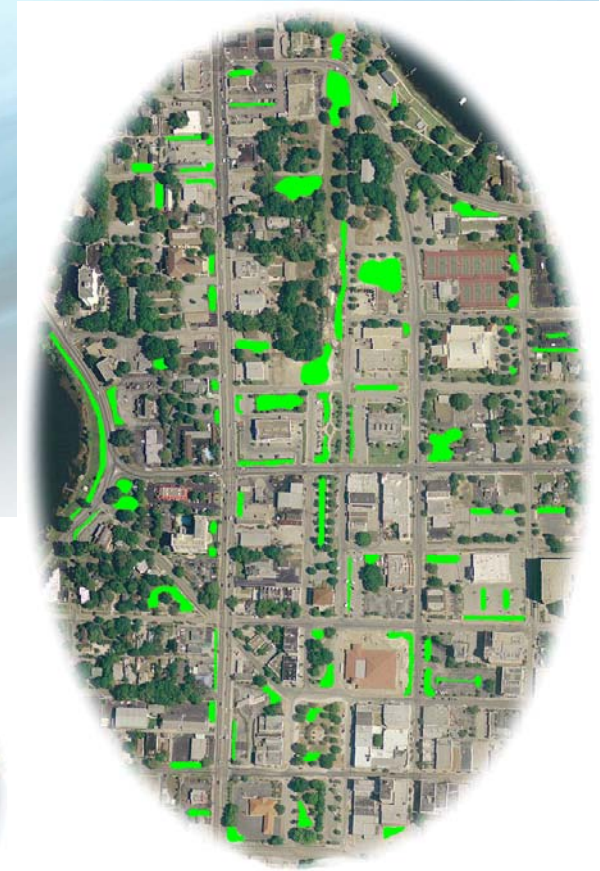
- rain gardens & pocket wetlands.

Capture runoff from streets:

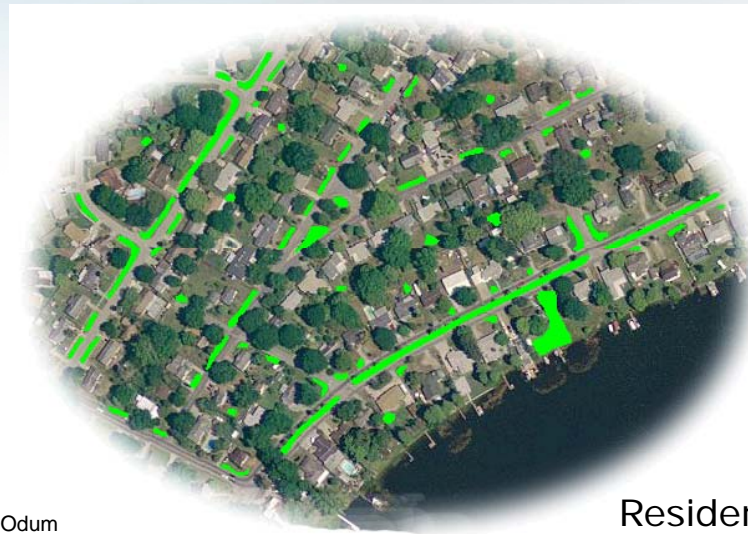
- roadside & parking lot swales.

Neighborhood parks:

- nature parks, open space.



Downtown



Residential

Roadside Swale



Parking Lot Swale



Pocket Wetland

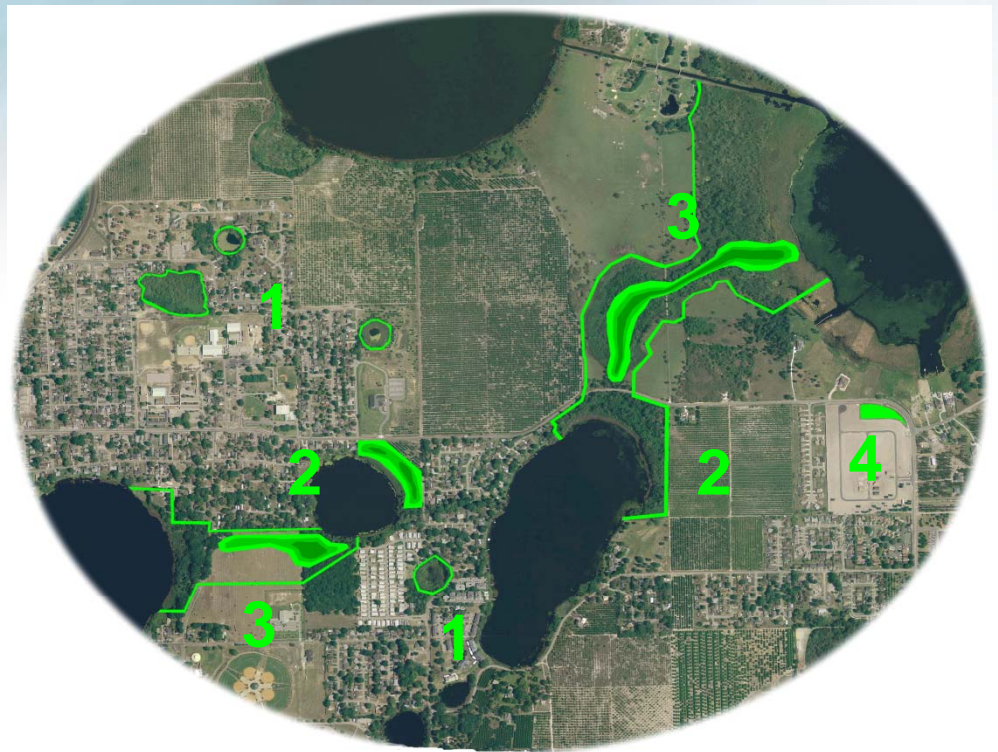


Rain Gardens

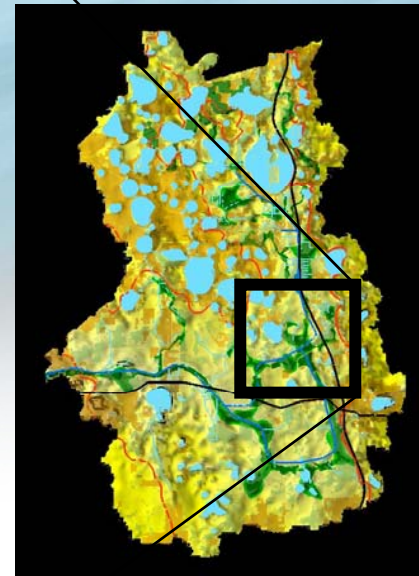
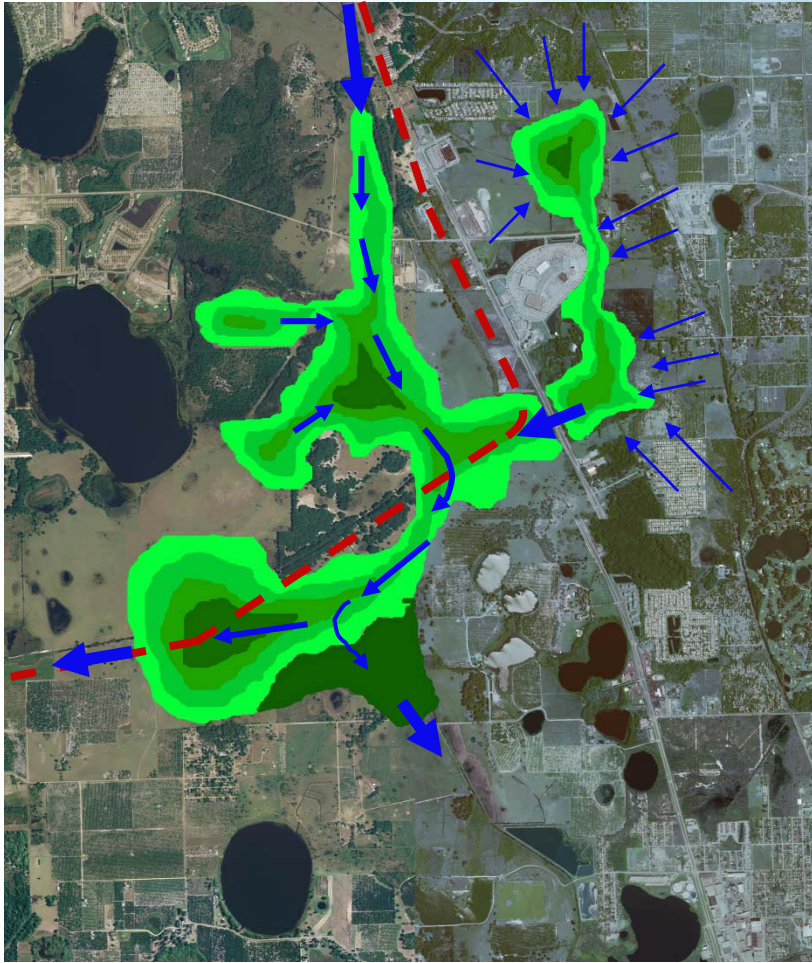


Increase Treatment & Infiltration: city's edge

- 1 – Preserve existing low-lying areas
- 2 – Enhance & extend wetland lake fringes
- 3 – Preserve wet corridors
- 4 – Require low-impact development

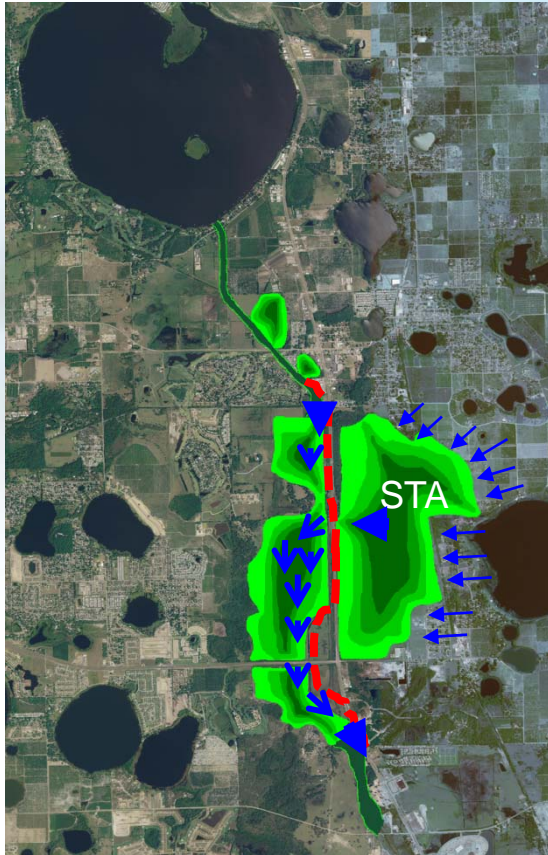


Increase Water Storage: wetland storage

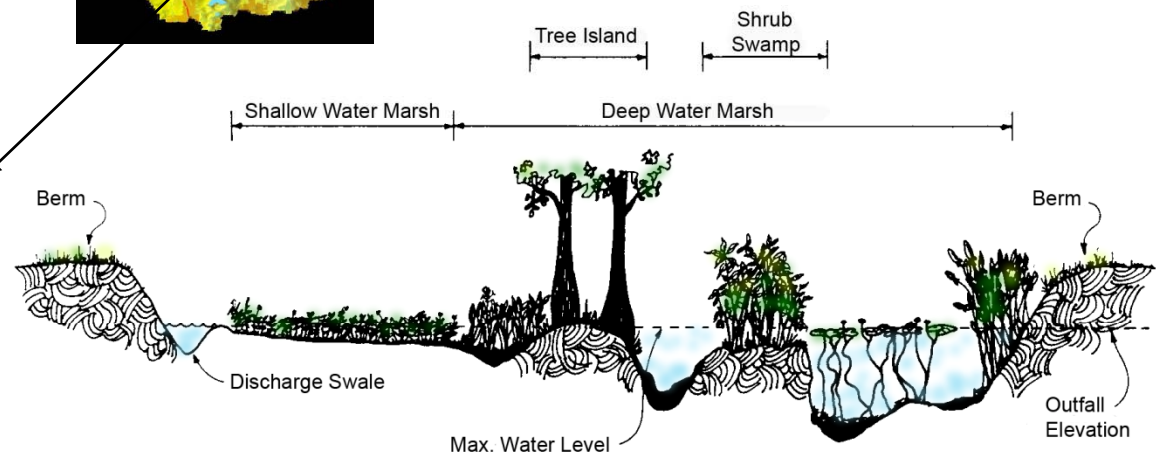
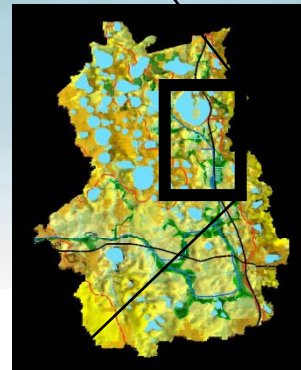


Designed to slow movement of water to provide storage during droughts & reduce peak flows during high rainfall for downstream flood protection.

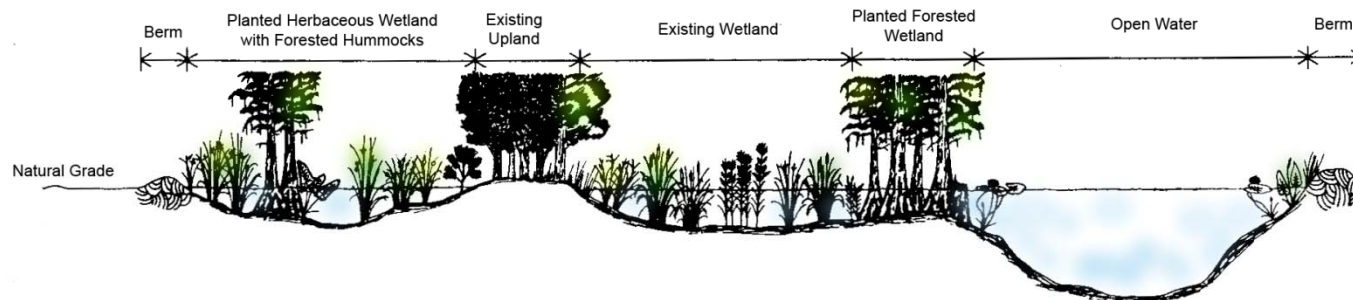
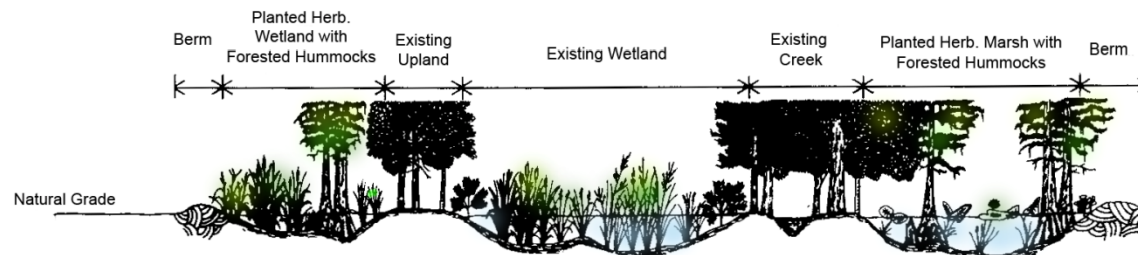
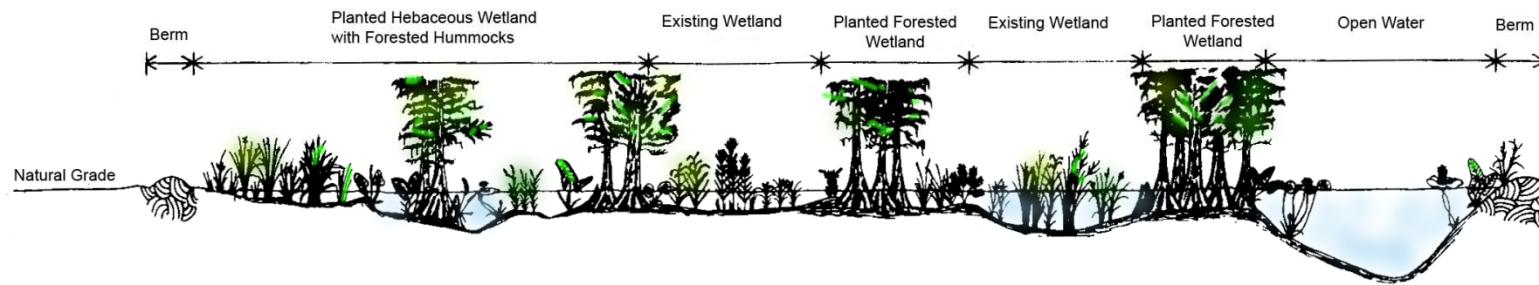
Increase Water Storage: stormwater treatment



Designed to receive sediments, nutrients, & other pollutants from existing development.



Increase Water Storage: wetland storage



Designed to be adaptable to changing environmental conditions, with little human maintenance.

Nature Parks:

Amenities for future growth, benefits to water resources

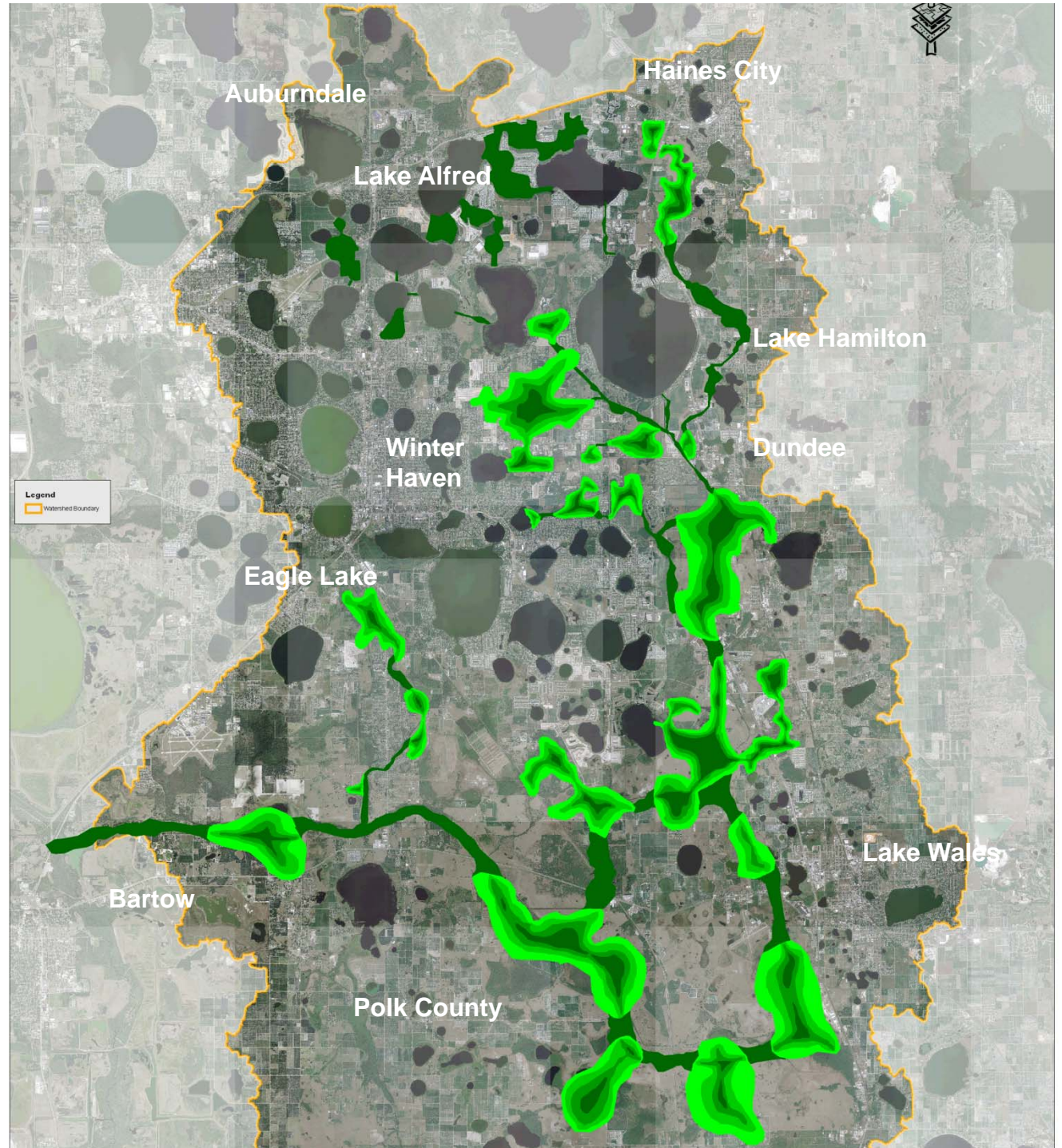


Circle B Reserve



Photos: by Jim Paulson (Mar. 09)

Conceptual Winter Haven/ Peace Creek Water Resource Sustainability Plan



Summary

- If natural system is used, multiple benefits for water can be achieved, versus expensive structural solutions in the future
- Multiple benefits include: more recharge to Floridan aquifer, better water quality, higher lake levels, improved natural systems
- Plan links communities in watershed hydrologically, with common benefits
- Benefits to natural systems and future development will occur
- “Sapphire Necklace” of lakes/wetlands/water storage nature parks

Chapter 4: Implementation



There is no endeavor more noble than the attempt to achieve a collective dream. When a City accepts as a mandate its quality of life; when it respects the people who live in it; when it respects the environment; and when it prepares for future generations, the people share the responsibility for that mandate. This shared cause is the only way to achieve that collective dream.

Source: Jaime Lerner, *Toward a Rechargeable City*, *Whole Earth Review*, Spring 1995.

Benefits of Integrated Long-Term Plan Using the Natural/Historical Infrastructure

Water Quality – Lakes/Rivers

Water Supply – Improved
recharge

Environmental – Wetlands/
habitat

Flood Protection – Storage and
Conveyance

Economic - Expanded waterfront,
mitigation banking, enhanced
permitting for wetlands,
stormwater, flooding, long-term
savings

Social/Cultural – Interconnected
nature parks, beauty,
frameworks for land use/water
decisions



Higher Priority: Middle/Lower Reaches: Increased Storage/Conveyance

No use in storing more water in the headwaters area if water is allowed to drain out of the system

Proactively Identify Storage/Conveyance Areas

Create Water Resource Overlay Ordinance for Future Growth

Flood water conveyance

Mitigation Banking

Mitigate within the watershed

Future Road Projects – Funding

Peace Creek Watershed Banking

SWFWMD – Existing efforts for hydrologic modeling



Carlton Arms Apartment Complex
Along the Peace Creek in SE Winter Haven –
concentrate density outside of storage areas



HeadWaters/Ridge Areas

Raingardens/swales
- SWFWMD Grant

Redirect Reuse water as high in the watershed as possible
- Reuse Feasibility Study



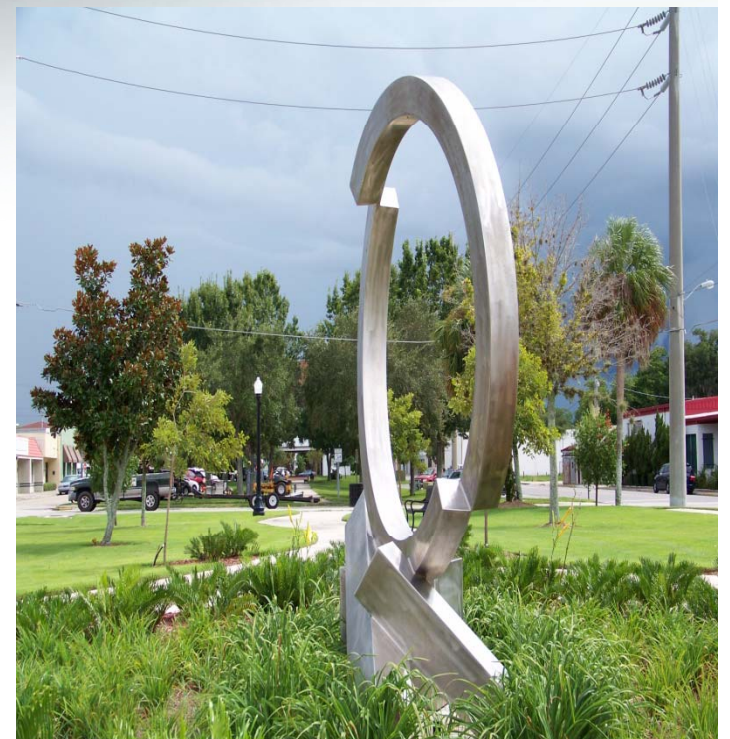
Maintain Lake Storage and Flood Protection

Other Recommendations:

Use Stormwater/Water Utility Funds

Monitor Lake/Aquifer Levels

Coordination with Other Efforts – SWUCA, Permitting, SWIM, FDOT, FDEP, etc.





Adoption Process

Community Presentations

Community Workshop

City Commission Adoption

County Commission Adoption

Adoption by other Cities within Watershed

SWFWMD Support

Quote Attributed to a Hopí Elder:

You have been telling people that this is the eleventh hour. Now you must go back and tell the people that this IS the hour, and there are things to be considered. Where are you living? What are you doing? Where is your water? Know your garden.

It is time to speak your truth, to create your communities, to be good to each other and to not look outside of yourself for a leader.

This could actually be a good time. There is a river flowing now, very fast. It is good and great and swift and there are those who will be afraid. They will try to hold on to the shore. Know that the river has its destination. The elders say we must let go of the shore, push off into the middle of the river, keep our eyes open and our heads above the water, see who is with us and celebrate.

At this time in our history we are to take nothing personally, least of all ourselves. For the moment we do so, our spiritual growth comes to a halt.

The time of the lone wolf is over. Gather yourselves. Banish the word "struggle" from your attitude and your vocabulary. All that we do now must be done in a sacred way and in celebration. We are the ones we have been waiting for.

(From the Century Commission Report on Sustainability)



The End

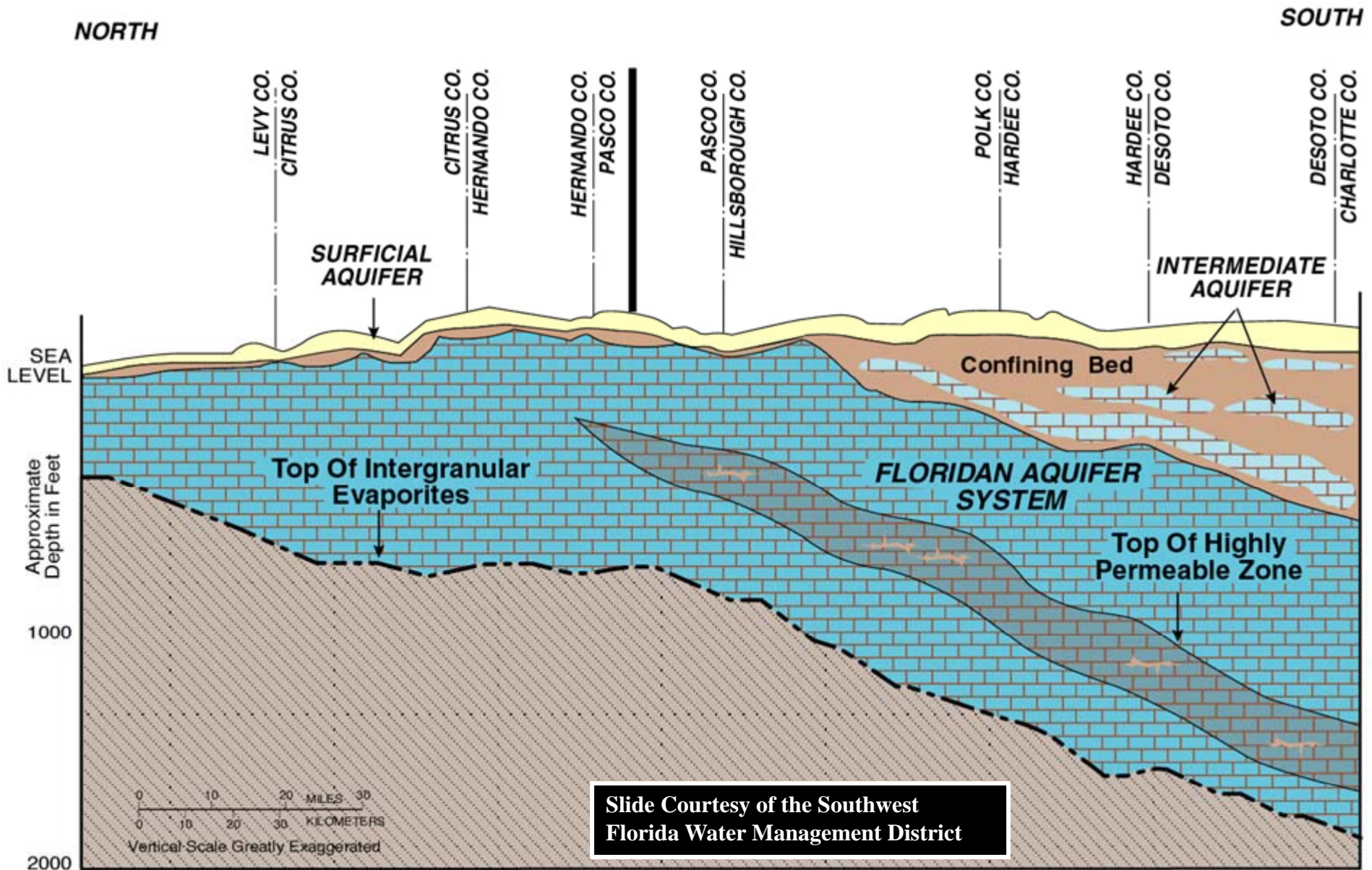
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Extra Slides to Follow:

Principles of Sustainable Water

- 1) The total rainfall in the region is the region's water budget
- 2) It is far more efficient and cost effective to use the natural infrastructure to provide benefits
- 3) Impacts to water need to be mitigated in the immediate watershed
- 4) Storage areas integrated into community design
- 5) All water sources are valuable and need to be recycled and recharged commensurate with use
- 6) Each parcel of land should contribute to its share of the region's water budget

General Hydrogeologic Cross Section of the Region



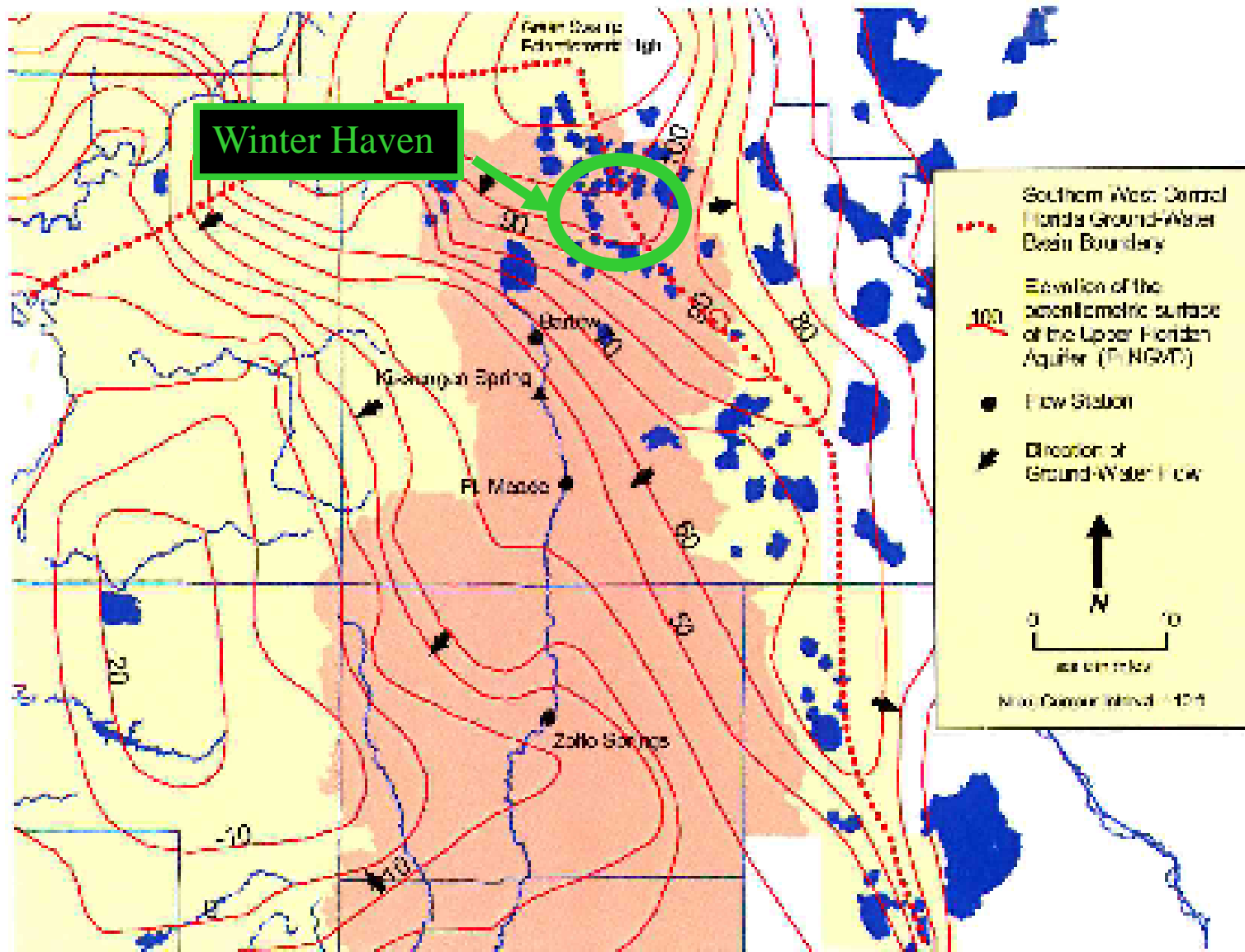
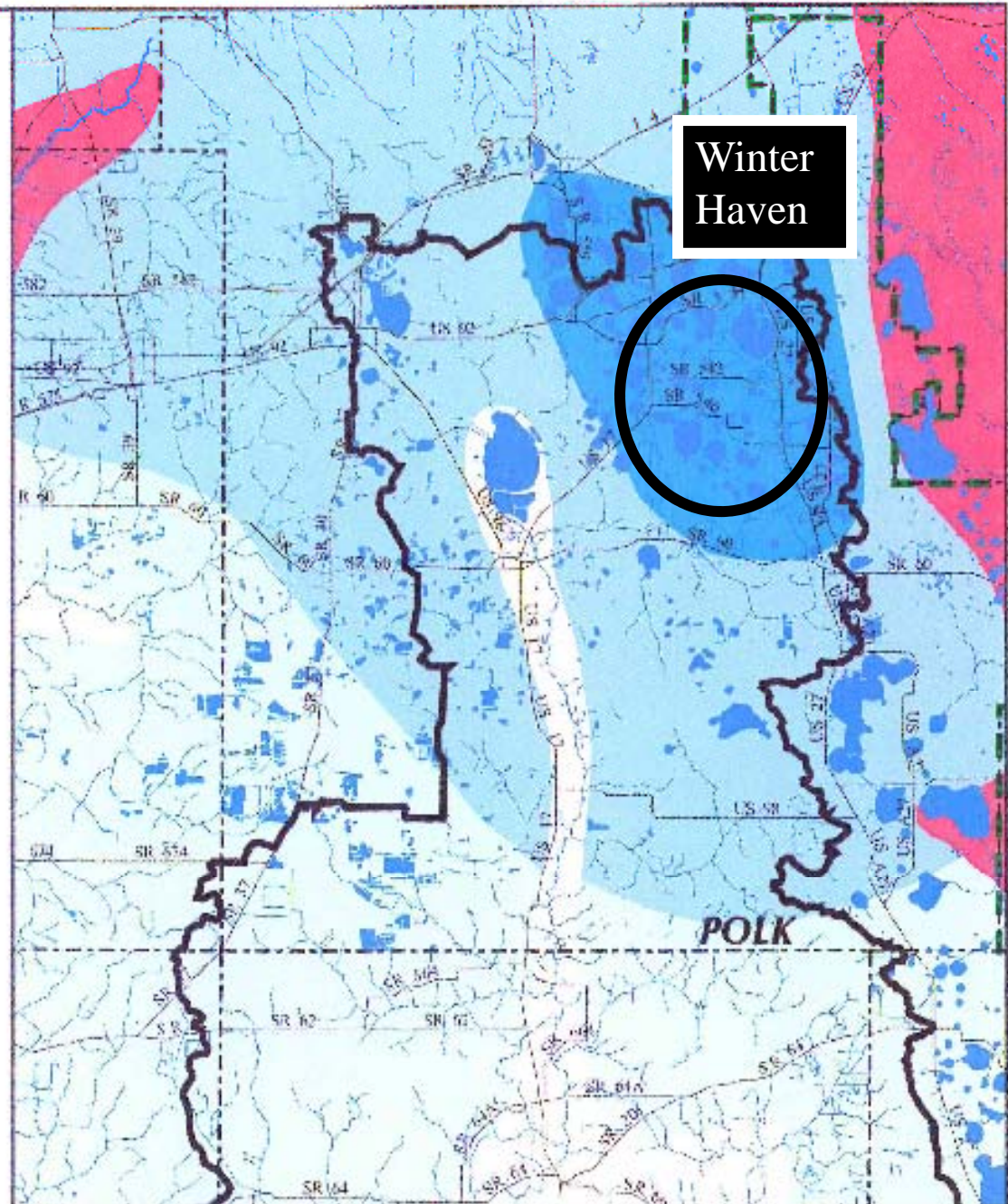


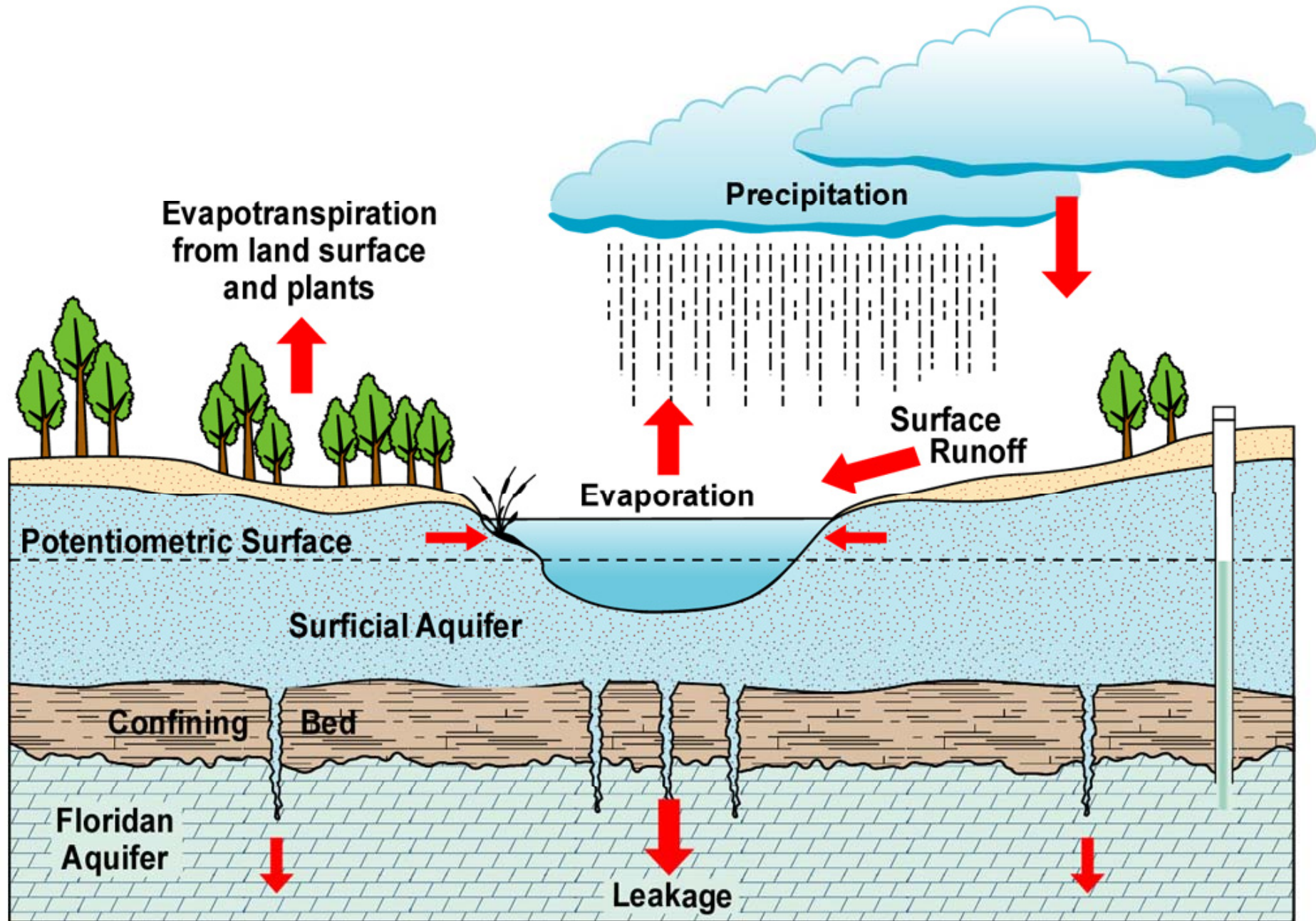
Figure 20. Potentiometric surface of the Upper Floridan aquifer, May 2002 (modified from Duer, 2001).

Peace River Watershed
Recharge to/Discharge from
The Floridan Aquifer
In Inches Per Year

-  Recharge Less Than 1
-  Recharge 1 To 10
-  Recharge Greater Than 10
-  Discharge Less Than 1
-  Discharge 1 To 5
-  Discharge Greater than 5
-  Watershed Boundary
-  County Boundary
-  District Boundary



Hydrologic Budget for a Seepage Lake



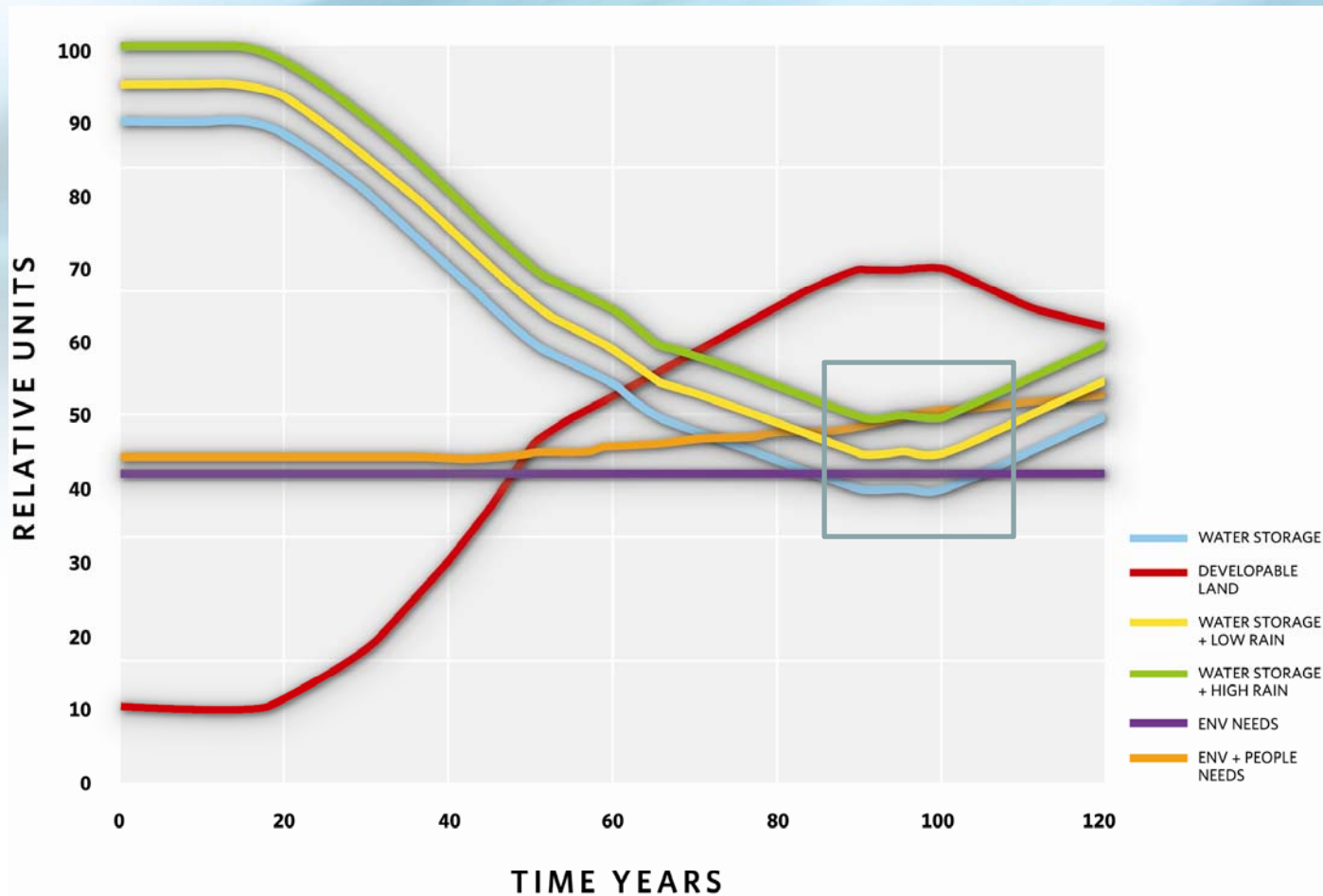


Unintended Results of past actions:

- Estimated 20% less recharge to Floridan aquifer
- Approx. 18 MGD leaving the system
- Loss of 27 Billion gallons storage (7.5 years worth of supply)
- Loss of 9,900 acres of wetlands
- 22% less flow to the Peace River during dry years
- Reduced water quality
- Lowered lake levels

(Source: Dr. Brown, U of F Center for Wetlands)

Sustainable Land & Water Resource Management



Chapter 3: The Conceptual Plan

Much of the 'natural infrastructure' (wetlands, floodplains, recharge areas) is still in place

Use historical conditions as a model for the future, not existing conditions.

Area will experience significant growth

Two categories for opportunities:

1) Headwaters/Ridge Areas:

- infiltrate stormwater/reuse water
- store as much water in lakes/wetlands/aquifers as possible

2) Storage & Conveyance Areas:

- use historical wetlands/floodplains for storage & conveyance



Conclusions:

If we continue with future development according to today's regulations, the condition of water will continue to worsen

Water quality, water supply, natural systems and flood control are equally important

Decisions we make today will affect our future, and the future of downstream users, for decades – even permanently

To restore essential functions, efforts should focus on re-creating the historical networking of water

To meet future water resource needs, the community will need to decide how much land to allocate both for development and for water storage

Restoration can accomplish significant improvements, approximately equivalent to conditions that existed 75 years ago

The impacts to water for every type of development should be considered and compensated for locally

Incorporating restoration projects as amenities will increase the economic and cultural viability of the community